

Speckle Interferometry at the U.S. Naval Observatory. XV.

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ABSTRACT

Results of 2433 intensified CCD observations of double stars, made with the 26-inch refractor of the U.S. Naval Observatory are presented. Each observation of a system represents a combination of over 2000 short-exposure images. These observations are averaged into 1013 mean relative positions and range in separation from $0''.96$ to $58''.05$, with a mean separation of $13''.50$. This is the 15th in this series of papers and covers the period 2008 January 3 through 2008 December 21.

Subject headings: binaries : general — binaries : visual

1. Introduction

This paper is the 15th in the series of papers from the U.S. Naval Observatory's speckle interferometry program, presenting results of observations obtained at the USNO 26 inch telescope in Washington, DC. Over 22,000 measures have now resulted from this program since its inception by Charles Worley, Geoff Douglass, and colleagues in the early 1990s (see Douglass et al. 1997).

From 2008 January 3 through 2008 December 21, the 26 inch telescope was used on 72 of 256 (28%) scheduled nights. Based on this raw number, it might be concluded that climatic conditions have degraded over those summarized in Mason et al. (2006b; see especially their Figure 1). However, there are currently fewer available observers, so nights judged as marginal are not covered to give preference to better nights. Consequently, while the number of nights covered and total observations may have dropped, the observations per night metric has gone up. While most nights were lost due to weather conditions, time was also lost due to equipment upgrades and to personnel observing on other telescopes. Since our primary speckle camera was in use at other facilities during this period, all of

these observations were obtained with the secondary camera, described by Mason et al. (2007).

Due to a larger plate scale and the lack of as many correcting optics as contained in the primary camera, pairs observed with this camera are at much wider separations. In fact, most of the systems observed with this camera have separations well beyond the regime in which there is any expectation of isoplanicity, so for purposes of the “method” column of the WDS, we classify the observing technique for all of these measures as just “CCD astrometry”, rather than speckle interferometry. Despite this classification, there is an expectation that the resulting measurements have smaller errors than would be expected for classical CCD astrometry. Each measurement is the result of many hundreds of correlations per frame, and up to several thousand frames per observation. This ensemble of observations is then processed and measured using the conventional directed vector autocorrelation techniques used by the CHARA and USNO speckle teams for over 20 years.

While individual nightly totals varied substantially (from 2 to 80 objects per night) these efforts yielded a total of 2433 observations and 2289 resolutions (i.e., usable double star measurements). After removing marginal observations, calibration data and tests, a total of 1684 measurements remained, which were grouped into 1013 mean positions. Included in these are 36 confirmations of binaries with only one previous observation. While some of these are relatively recent discoveries of the *Hipparcos* or *Tycho* missions (ESA 1997), some of these pairs had remained unconfirmed for over 100 years.

Observing list construction and calibration procedures remain the same as those described for the secondary camera in Mason et al. (2007). The plate scale of the secondary camera is not appropriate for the slit-mask calibration technique used for the primary camera, so observations of well-observed doubles were used instead. Evaluation of the ensemble of the tabulated $O - C$ in Table 2 allows the error to be grossly characterized as ± 1.0 in position angle (θ) and $\pm 1\%$ in separation (ρ).

2. Results

Table 1 presents the mean relative position of the members of 754 systems having no published orbital elements. The first two columns identify the system by its epoch-2000 coordinates and discovery designation. Columns 3-5 give the epoch of observation (expressed as a fractional Besselian year), position angle (in degrees), and separation (in arcsec). Note that the position angle has not been corrected for precession, and is thus based on the equinox for the epoch of observation. Objects whose measures are of lower quality

are indicated by colons following the position angle and separation. These lower-quality observations may be due to one or more of the following factors: close separation, large Δm , one or both components very faint, a large zenith distance, and poor seeing or transparency. They are included primarily due to either the confirming nature of the observation or the number of years since the last measured position. The sixth column indicates the number of independent measurements (i.e., observations obtained on different nights) contained in the mean, and the seventh column flags any notes. The 754 mean positions in Table 1 have an average separation of $12''.29$.

The most common note indicators are either “C,” indicating a confirming observation, or a number (N) indicating the number of years since the system was last measured. This is only given for systems with $N \geq 50$ years. Thirty-six systems are confirmed here. Since priority is given to both unconfirmed systems and to systems not observed recently, the time since last observation can be surprisingly large; for the systems in Table 1 the average time since the last observation is 12 years (67 years for those measures of reduced accuracy). Thirty-two systems had not been observed in 50 years or more and 12 had not been observed for at least a century. The maximum such time span was 114 years for the pair SEI 374, which was first measured off *Carte du Ciel* plates by Scheiner (1908).

Table 2 presents the mean relative positions for 254 binary star systems with published orbital determinations or linear solutions. The first six columns are identical to the corresponding columns of Table 1. Columns 7 and 8 give O–C residuals (in θ and ρ) to the determination referenced in Column 9. Like Table 1, the position angle has not been corrected for precession, however, the residual is relative to the precessed value. The reference is to either a published orbit or a determination in the “Catalog of Rectilinear Elements” (Hartkopf et al. 2006), indicated by the letter **L**. The objects in Table 2 tend to be more frequently observed than those in Table 1, with a mean separation of $17''.34$, and a mean time interval since last observation of only 1.4 yr. For those 50 pairs with orbits, the mean separation is $4''.92$ and time since last observation is 0.6 yr; both values are significantly less than $20''.39$ and 1.6 yr for those 204 pairs with linear solutions. This is appropriate; given measurements of equal quality, linear systems are more well suited for calibration and should not require the same high observing cadence as orbit systems. As discussed in Mason et al. (2008, §3), double stars in which one component has high proper motion can be ascertained as either optical or physical using a single high precision measure, assuming sufficient time has passed since the last observation. Based on this methodology, none of the pairs in Table 2 are identified as optical but three are identified as physical (i.e., common proper motion). These are indicated in Table 1 with notes.

3. Double Stars not Found

Table 3 presents 12 systems which were observed but for which no companions were detected. Possible reasons for nondetection include orbital or differential proper motion making the binary too close or too wide to resolve at the epoch of observation, a larger than expected Δm , incorrect pointing, and misprints and/or errors in the original reporting paper. It is hoped that reporting these will encourage other double star astronomers to either provide corrections to the USNO observers or verify the lack of detection. Indeed, some of these systems in Table 3 may be optical doubles as described in the preceding section.

The continued instrument maintenance by the USNO instrument shop, Gary Wieder, John Evans, Tie Siemers and David Smith, makes the operation of this vintage telescope a true delight. Thanks also to Ted Rafferty (USNO, retired) for his assistance with equipment upgrades and maintenance, and the foresight to initiate the backup camera project. This research has made use of the SIMBAD database, operated at CDS, Strasbourg, France. Thanks are also extended to Ken Johnston, Ralph Gaume and the U.S. Naval Observatory for their continued support of the Double Star Program.

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Table 1. ICCD Measurements of Double Stars

WDS Desig. α, δ (2000)	Discoverer Designation	Epoch 2000.+	θ ($^{\circ}$)	ρ ($''$)	n	Note
00093+5324	ES 928	8.618	18.0	8.32	3	
00096+4758	ES 1126	8.634	318.3	6.36	3	
00138+4648	ROE 59	8.634	214.0	12.24	2	
00162+4915	FOX 104	8.634	49.9	16.55	1	
00162+4915	FOX 104 AC	8.634	292.5	27.96	1	
00336+4509	A 912 A-BC	8.634	205.1	15.58	1	
00350+4850	HJ 1985	8.634	146.7	18.81	2	
00353–0942	CHE 28	8.975	126.2	8.49	1	
00405–1631	BU 109 BC	8.975	160.3	11.73	2	
00406–0023	ARG 48	8.975	62.6	18.13	2	
00431+3913	MLB 1054	8.634	350.9	11.24	2	
00454–1642	ARA 141	8.975	281.3	6.18	2	
00521–1451	HJ 2000	8.975	115.2	17.52	2	
00588+4455	HJ 1060	8.618	288.8	8.95	1	
00599+4935	HJ 1062	8.634	103.9	10.54	1	
01001+4443	STF 79	8.618	194.0	7.82	3	
01025–1004	HJ 2012	8.975	162.3	11.95	2	
01044–0518	STF 85 BC	8.975	53.5	23.26	4	
01058+0455	STF 90	8.975	83.6	32.84	1	
01068–0015	HJ 2016	8.975	359.0	22.59	2	
01069–1303	HJ 2017	8.976	53.0	16.61	2	
01099+4011	AG 15	8.618	70.3	2.78	1	
01119+4748	BU 398	8.634	44.5	1.78	2	
01121–1338	SKI 1	8.975	250.5	6.47	1	
01121+4700	BU 236	8.634	113.9	5.30	3	
01121+6111	KR 10	8.792	277.6	3.46	1	
01137+0735	STF 100	8.975	62.9	22.75	2	
01146+4102	AG 300	8.618	44.8	6.58	3	
01188+4248	ROE 63	8.634	98.2	8.48	1	
01348+5209	ES 759	8.618	90.9	10.37	2	
01354+4123	ES 1494	8.618	6.5	5.62	1	
01391+1211	HJ 17	8.822	281.7	8.17	1	
01400–1348	GAL 311	8.823	29.2	32.60	1	
01431+3917	MLB 8	8.634	98.9	7.00	3	
01464–0224	STF 160	8.822	270.0	9.92	1	
01493+4754	STF 162	8.634	199.0	1.86	2	
01501+2217	STF 174	8.822	164.7	2.87	1	
01508+5939	MLB 47 AC	8.793	130.1	36.83	1	
01513+6451	STF 163	8.688	36.3	34.22	5	
01524+4125	MLB 9	8.634	320.2	6.16	3	
01535+1918	STF 180	8.822	0.6	7.41	1	
01554+7613	STF 170	8.792	242.8	3.09	1	
01568+1505	AG 27	8.822	266.1	15.46	1	
02031+5237	COU 2678	8.009	86.4	1.92	2	
02039+4220	STF 205 A-BC	8.634	63.3	9.58	3	
02091+5104	STF 213	8.634	325.2	1.80	2	
02109+3902	STF 222	8.675	35.8	16.55	1	
02133+3648	ALI 263	8.675	318.2	12.87	2	
02162+3750	ES 2451	8.009	47.8:	7.02:	2	77,C
02213+3726	STF 250	8.675	135.5	3.11	1	

Table 1—Continued

WDS Desig. α, δ (2000)	Discoverer Designation	Epoch 2000.+	θ ($^{\circ}$)	ρ ($''$)	n	Note
02217+3441	PTT 4 A-BC	8.069	294.6	15.19	2	
02217+3923	STF 251	8.675	265.1	2.06	1	
02217+7623	STF 233	8.793	273.3	1.82	2	
02281+3251	ES 2407	8.009	282.0	6.70	2	
02285+1611	HEI 22	8.077	51.8	2.94	1	
02313+4703	A 968	8.793	25.4	1.56	2	
02374+5653	MLB 1062	8.009	175.4	8.58	2	
02404+2945	MLB 1063	8.069	183.5	12.58	2	
02410+3450	AG 44	8.009	287.5	9.88	2	
02421+3445	ES 2276	8.675	49.2	30.87	1	
02421+3445	ES 2276 BC	8.675	56.1	6.30	2	
02429+5814	MLB 52	8.009	10.3	4.49	2	
02429+5904	STI 1926	8.009	343.9	14.06	2	
02529+3901	ROE 68	8.675	257.3	10.10	1	
02531−1212	GAL 327	8.793	332.4	11.11	2	
02534+3806	ES 2455	8.675	207.3	8.30	2	
02538+3814	J 885	8.675	273.6	4.10	3	
03045+3844	SMA 33	8.675	31.3	11.43	2	
03083+3101	HJ 331	8.077	308.9	18.38	3	
03113+3805	ALI 514	8.675	210.1	12.16	2	
03128+3720	WZ 6	8.069	202.0	7.06	2	76
03155+3840	AG 64	8.675	237.7	8.85	2	
03171+4029	STF 369	8.793	29.8	3.57	1	
03193+4559	STF 372	8.793	291.6	7.68	2	
03253+5932	ES 53	8.009	334.0	3.66	3	
03300−1109	STF 407	8.105	52.7	2.70	2	
03306+4947	HLD 8	8.793	177.2	2.32	2	
03314+2148	STF 404	8.077	202.6	29.04	2	
03327+4534	ARG 56	8.793	164.1	28.67	1	
03343+5817	STF 398	8.793	332.6	9.70	1	
03354+3341	STF 413	8.009	125.2	2.38	2	
03383+4448	S 430	8.057	96.0	40.98	2	
03390+4445	ES 1312	8.009	102.8	2.29	2	
03427+6950	STF 419	8.793	73.5	2.86	1	
03460+1000	PLQ 43	8.107	339.3	15.08	2	83
03462+1710	HJ 3252	8.077	302.3	14.30	2	
03474+2355	STF 450	8.095	263.2	6.16	9	
03482+2235	LOH 1	8.077	132.0	9.43	2	
04023+2142	SCA 29	8.107	144.0	8.35	3	
04078+6220	STF 485 AE	8.793	304.9	17.90	1	
04122+2805	MLB 558	8.009	357.5	8.85	3	
04132+1556	CHE 77	8.077	125.6	5.96	2	
04133−0931	FOX 6	8.129	2.7	2.29	2	
04190+1506	HJ 3255	8.077	131.8	13.79	2	
04198+2344	STF 523	8.107	164.1	10.12	3	
04260+4515	ES 567	8.124	353.4	37.31	2	
04260+4515	ES 567 BC	8.124	128.5	8.13	4	
04295+0025	BAL 972	8.129	232.2	2.72	3	
04314+4001	STF 552	8.124	115.8	8.98	3	
04320+5355	STF 550	8.009	308.1	10.30	2	

Table 1—Continued

WDS Desig. α, δ (2000)	Discoverer Designation	Epoch 2000.+	θ ($^{\circ}$)	ρ ($''$)	n	Note
04335+1801	STF 559	8.077	276.7	3.03	2	
04352–0944	STF 570	8.105	259.9	12.73	3	
04458+2917	MLB 559 AC	8.129	340.3	27.25	1	
04476+3947	ES 2088	8.124	63.5	21.47	2	
04495+3914	STF 594	8.107	331.4	9.28	2	
04510+1520	STF 605	8.077	282.7	11.50	2	
04531+2529	STF 607	8.077	250.8	14.28	2	
04544+2145	STF 611	8.108	206.8	14.20	2	
04551–0033	STF 614 BC	8.105	69.3	9.53	3	
04552+1451	HJ 3262	8.077	233.0	12.93	2	
04565+0427	BAL 2622	8.129	272.2	40.81	1	98,C,1
04565+3809	SEI 51	8.077	236.0	15.89	2	
04572+2030	HJ 2245	8.108	190.8	27.08	2	
04581+0141	STF 622	8.105	163.1	2.44	2	
05008+3811	SEI 52	8.124	107.3	34.35	2	113,C
05021+6910	BU 313 AC	8.107	156.3	29.38	2	110
05021+6910	BU 313 AD	8.107	152.1:	28.16:	1	110,C
05031+4933	BU 315	8.137	216.3:	47.06:	2	107
05034+1718	XMI 7	8.108	244.3:	22.86:	2	C
05070+3325	STF 640	8.173	98.5	9.34	2	
05074+2715	DOO 30	8.078	188.0	7.11	1	
05079+0824	STF 643	8.173	124.3	2.53	1	
05110+3203	STF 648	8.173	61.8	4.68	2	
05152+0826	STF 664	8.173	176.2	4.76	2	
05154+3241	STF 653 AC	8.134	225.7	14.37	5	
05157+1944	STF 665	8.173	252.9	1.60	1	
05159+3425	ES 170	8.137	10.8	22.76	5	
05161–0535	STF 675 AC	8.173	8.4	9.39	2	
05167+1826	STF 670	8.173	164.9	2.54	2	
05171+1837	COU 38	8.150	232.7	1.90	5	
05172+3320	STF 666	8.173	74.9	3.07	2	
05173+2746	HJ 359	8.138	141.3	29.20	4	
05174+2605	STF 671	8.173	125.3	18.05	1	
05177+0441	STF 678	8.173	102.7	11.18	2	
05185+1800	J 1818	8.138	354.2	6.22	1	
05187+0359	STF 682	8.173	115.4	16.68	2	
05193–1045	STF 688	8.173	94.5	10.62	2	
05193–1831	S 476	8.105	18.6	38.97	1	
05196+3702	SEI 181	8.138	144.5	40.22	2	
05197+2511	STF 679	8.173	316.6	20.36	1	
05228+3658	SEI 220	8.042	323.9	5.37	1	
05228+3658	SEI 222 AC	8.042	337.2	24.53	1	113,C
05245+3909	ES 2093	8.124	322.1	2.01	2	
05263–0220	DOO 33	8.162	21.0	4.35	2	
05273+3426	D 7	8.162	329.7	21.17	2	
05279+4441	ES 1377	8.124	189.7	4.24	3	93
05284+3549	SEI 273	8.162	288.1	11.56	2	
05284+3549	SEI 274 AC	8.162	359.5	15.67	3	
05302+4145	A 1720	8.124	273.7	2.07	2	
05353–0523	STF 748	8.173	31.8	8.78	2	

Table 1—Continued

WDS Desig. α, δ (2000)	Discoverer Designation	Epoch 2000.+	θ ($^{\circ}$)	ρ ($''$)	n	Note
05353–0523	STF 748 AD	8.173	95.8	21.90	2	
05357+1845	XMI 9	8.129	60.1	30.04	1	
05420+3401	SEI 374	8.162	299.5	16.80	2	114,C
05428+2652	HJ 707	8.129	193.1	11.21	2	
05446+2901	STF 783	8.129	23.0	8.47	2	
05476+1736	BU 1401	8.108	170.4	15.19	1	
05477+2157	SLE 280	8.108	231.2	11.88	1	
05518+1026	AG 319	8.108	354.6	36.12	1	
05532+1441	J 2013	8.108	265.8	7.42	1	
05544+1854	STF 813	8.105	149.3	3.00	2	
05552+7652	STF 760	8.042	37.0	31.13	2	
05573+2722	HJ 374	8.042	229.7	12.87	3	
05598+4752	ES 1232	8.042	268.3	4.41	2	
05598+4752	ES 1232 AC	8.042	177.9	21.97	2	95,C
05598+8238	MLR 493	8.179	176.1	3.04	2	
06037+2741	HJ 5467	8.042	155.0	10.06	2	
06074–0400	STF 850	8.160	17.8	1.98	3	
06081+0317	STF 851	8.105	32.9	2.93	2	
06125+2025	J 1926	8.179	1.8	6.23	3	
06138+3509	GCB 16	8.179	3.7	6.46	1	84,C
06191+0606	HAU 18	8.138	319.7:	15.87:	1	C
06212+2108	S 513 CT	8.042	291.8	51.91	1	
06230+2210	OL 67	8.179	40.4	5.20	2	
06231–1553	STN 13 AC	8.138	296.9	44.21	1	
06233+2209	OL 207	8.179	73.3	4.69	2	
06236+0444	BAL 2660	8.138	223.6	10.86	1	
06265+2011	J 1823	8.108	190.3	5.87	2	
06273+0532	SLE 285	8.138	75.0	18.58	1	C
06287+0448	J 660	8.138	98.6	2.43	1	
06293+1957	SLE 752	8.108	191.7	4.78	2	
06314+2008	SLE 759	8.108	155.0	10.22	1	
06314+2021	SLE 758	8.108	336.8	11.98	2	
06322+2049	SLE 760	8.179	40.4	8.72	2	
06368+2335	GCB 20	8.108	229.0	8.46	1	
06377+2339	STF 942	8.162	245.5	8.15	3	
06410+0954	STF 952 MN	8.162	115.8	14.09	2	
06415+0950	STF 3118	8.162	173.6	2.67	2	
06546+0449	BAL 2711	8.138	72.3	17.93	1	
06569–0529	STF 998	8.162	211.0	3.12	2	
06592+1843	BU 899 AC	8.138	176.5	24.15	1	
07009–0318	J 315	8.162	219.0	4.15	3	
07022+2028	SLE 390	8.138	23.7	16.57	1	
07022+2028	SLE 390 AC	8.138	331.2	50.02	1	
07030+2427	HJ 409 BC	8.138	353.0	14.92	1	
07040+1934	SLE 396	8.138	179.8	23.68	1	
07119–0738	AG 330	8.173	264.2	2.18	2	
07158–0037	HWE 17	8.173	315.7	2.45	2	
07208+3151	SEI 478	8.173	24.5	4.37	1	
07239+1408	HJ 3291	8.179	115.8	4.75	1	
07239+1408	SLE 406 AD	8.179	84.2	55.52	1	

Table 1—Continued

WDS Desig. α, δ (2000)	Discoverer Designation	Epoch 2000.+	θ ($^{\circ}$)	ρ ($''$)	n	Note
07253+0312	J 1063	8.173	57.2:	2.45:	1	54
07361–1337	RST 3528	8.220	42.3:	1.71:	1	65
07447–1408	BRT 1892	8.220	67.0	38.26	1	106
07455–1441	STF 1138	8.220	339.3	16.71	1	
07507+1539	HJ 3302	8.042	331.7	14.69	2	
07519+2215	AG 144	8.042	338.5	11.44	3	
07569+0327	BAL 2315	8.042	249.7	13.53	2	98,C
07586+1628	STF 1167	8.042	228.7	12.12	2	
07598+1341	STF 1170	8.174	107.1	2.24	2	
08014+1657	STF 1173	8.174	51.6	10.59	2	
08054+0812	STF 1181	8.174	140.9	5.20	2	
08094+3021	STF 1188	8.174	201.2	16.48	2	
08122+1739	STF 1196 AC	8.297	68.5	6.58	2	
08122+1739	STF 1196 BC	8.297	72.0	5.79	2	
08339+0135	STF 1243	8.294	233.2	1.69	1	
08350–0924	A 1339	8.294	194.3	2.37	1	
08405–1439	HU 118	8.294	327.1	2.34	1	
08406–0410	RST 4416	8.294	332.6	1.99	1	
08434+0340	BAL 2821	8.297	82.2	10.08	2	
08454–1407	HU 119	8.294	355.9	2.56	1	
08509+1136	CHE 116	8.297	111.7	17.69	2	
08518–1108	SCJ 11	8.174	353.2	2.13	1	
08542+3035	STF 1291	8.297	310.6	1.50	2	
08555–0514	HJ 2476	8.294	31.8	14.04	1	
09036–0610	BRT 425	8.294	149.7:	3.58:	1	101
09144+1608	STF 1325	8.332	76.7	17.32	1	
09184+3522	STF 1333	8.290	49.4	1.88	4	
09188+3648	STF 1334	8.288	225.7	2.80	1	
09212+2728	HJ 810 AB-C	8.332	26.5	21.78	1	
09245+0621	STF 1348	8.288	314.5	1.93	2	
09338–1020	A 131 AC	7.289	17.8:	29.64:	2	106,C,2
09338–1020	A 131 AC	8.294	16.0:	30.21:	1	
09383–1956	RST 2645	8.294	274.4	2.10	1	
09410–1250	RST 3656	8.288	302.4	2.09	1	
10022–1946	B 781	8.294	343.0	2.30	1	
10040–1806	SHJ 110 AC	8.288	273.7	21.23	1	
10157–1951	ARA 666 BC	8.294	11.0	28.06	2	
10314–0226	A 1350	8.288	317.2	2.58	2	
10350+0839	STF 1450	8.332	154.0	2.15	1	
10415+2423	POU 3084	8.349	202.6	26.56	1	
10422+2334	POU 3086	8.349	33.2	7.17	2	
10433+0445	STF 1466	8.351	239.2	6.76	1	
10447+2042	STF 1468	8.349	333.5	4.21	3	
10534+1326	HJ 2547	8.332	58.4	28.11	2	
10556+2445	STF 1487	8.349	112.2	6.60	4	
10565+2633	TDS 608	8.349	265.7	1.56	2	C
10566+2755	HJ 491	8.349	119.6	18.55	1	
11111+3027	STT 231	8.349	262.5	34.10	1	3
11161+5246	STF 1520	8.368	343.1	12.34	2	
11175+5900	ES 1786	8.368	335.9	3.92	2	

Table 1—Continued

WDS Desig. α, δ (2000)	Discoverer Designation	Epoch 2000.+	θ ($^{\circ}$)	ρ ($''$)	n	Note
11175+5900	ES 1786 AC	8.368	123.0	37.90	2	
11336+3702	HJ 502 Aa,Ab	8.349	284.6	1.25	1	
11396+2657	STF 1564	8.349	86.8	5.18	3	
11436+6159	TDS 8008	8.368	104.0	2.32	1	C
11438+2423	HJ 509	8.349	298.2	11.24	1	
11445–0805	A 140	8.294	138.7	2.52	1	
11512+1159	HJ 191	8.332	270.1	24.89	1	
11559+2420	POU 3118	8.349	92.3	17.30	1	
11561+2015	BRT 2289	8.349	86.4	1.54	1	
11589+6832	TDS 8147	8.368	71.1	2.45	1	
12061+7022	A 76	8.368	222.0	22.31	1	
12061+7022	A 76 A-BC	8.297	42.1	22.36	2	
12141+3247	STF 1615	8.288	87.7	26.57	2	
12147+5853	ES 1788	8.368	188.5	2.97	1	
12150+5501	HJ 2605	8.368	311.5	22.02	2	
12182–0357	STF 1627	8.409	195.4	19.87	1	
12205+3109	SEI 531	8.349	28.0	30.83	1	
12207+2255	STF 1634	8.349	146.7	5.35	3	
12231+2324	POU 3123	8.332	342.3	17.68	1	
12235–2015	HJ 4517	8.409	185.4	14.10	1	
12351+1823	STF 1657	8.349	270.4	20.10	1	
12384+1347	HJ 2616	8.409	282.9	19.01	2	
12384+1347	HJ 2616 AC	8.409	304.7	20.10	2	
12388+1252	AG 343	8.409	324.9	8.50	2	
12413–1301	STF 1669	8.409	312.8	5.24	1	
12449+4326	A 1783	8.368	213.8	1.75	2	
12515–1920	J 1584	8.409	272.4	11.16	1	
12525+0712	HJ 2621	8.409	266.9	32.88	1	
12525+0712	HJ 2621 AC	8.409	129.4	38.43	1	
12539+7440	STF 1698	8.368	108.6	10.08	2	
13027–0159	HJ 1225	8.409	111.1	15.10	2	
13049+3011	SLE 909	8.349	105.5	25.43	1	
13099+3122	STF 1727	8.349	333.6	7.53	3	
13134–1850	SHJ 151	8.447	33.2	5.32	1	
13152–1200	J 1605	8.447	296.3	6.62	1	
13180+7010	MLR 159	8.368	198.3	2.50	1	
13208+3158	ES 308	8.412	113.6	7.25	2	
13220–2250	BU 1435	8.447	283.8	6.00	1	
13225+1543	HEI 371	8.349	179.7	1.61	2	
13233–1456	STF 1738	8.447	278.0	3.71	1	
13238+3606	KZA 62	8.412	272.2	34.90	1	
13282+0138	HEI 774	8.447	212.6	1.64	1	
13304–1256	HJ 2656	8.447	326.8	21.84	1	
13337+2727	STF 1759	8.294	153.9	10.35	1	
13346+3308	BU 933	8.412	23.6	2.71	2	
13376–0752	STF 1763	8.447	39.8	2.66	1	
13377+0223	STF 1764	8.473	30.4	15.68	5	
13393–0436	BVD 6	8.447	97.8	32.42	1	
13397–1315	RST 3847	8.505	330.8	1.97	2	
13483–0338	J 1608	8.447	249.9	6.43	2	

Table 1—Continued

WDS Desig. α, δ (2000)	Discoverer Designation		Epoch 2000.+	θ ($^{\circ}$)	ρ ($''$)	n	Note
13483–0338	J	1608 AC	8.447	256.8	25.46	1	55
13490+3056	BRT	250	8.411	137.0	5.45	2	
13494+0149	HEI	776	8.294	84.9	2.38	1	
13527–2058	DON	1108	8.447	298.5	5.70	1	
13572–1233	HJ	4637	8.447	141.7	13.42	1	
13577–1717	HJ	2692 AC	8.447	223.9	30.59	1	
13577–1717	WHC	12	8.447	321.4	3.15	1	
14054+0558	STF	1801	8.470	72.7	21.64	4	
14066+2443	COU	303	8.294	289.3	2.00	1	
14066+6613	MLR	166	8.368	124.8	3.24	2	
14066+6613	MLR	166 AC	8.368	65.5	23.57	2	
14073–1303	BRT	2737	8.447	27.5	2.46	1	
14101+2636	STF	1808	8.422	81.5	2.60	2	
14108–1448	SKI	8	8.447	338.5	10.70	1	
14126+4512	STF	1815	8.368	150.4	8.92	2	
14143+3356	STF	1818	8.412	330.2	5.45	3	
14152+4658	STF	1826	8.368	310.2	4.34	2	
14165+0145	H N	1	8.486	108.8	18.61	2	
14165+0145	H N	1 BC	8.486	178.6	18.86	2	
14192+4223	AG	193	8.368	130.1	7.60	3	
14219–1344	HJ	4674	8.471	279.2	17.74	3	
14229+4623	HJ	2716	8.368	86.4	5.37	3	
14255–1958	SHJ	179	8.447	295.3	34.77	1	
14270+0341	STF	1842	8.398	17.9	2.68	1	
14279+2123	HO	543	8.398	237.0	4.65	1	
14317+3554	ALI	366	8.412	285.5	6.70	3	
14407+1625	STF	1864	8.398	110.7	5.50	2	
14409+3828	ALI	860	8.458	289.6	13.84	1	
14427+1157	HEI	533	8.502	50.5	2.26	3	
14430+1310	KU	48	8.398	137.1	6.55	2	
14430+1310	KU	48 AC	8.398	103.2	36.41	1	
14430+1310	KU	48 BC	8.398	96.1	31.01	1	
14450–2034	HJ	2741	8.447	34.6	14.41	1	
14457+3058	SEI	537	8.423	307.3	7.27	2	
14484+2422	STF	1884	8.398	55.8	2.11	1	
14492+5323	HJ	2751	8.368	122.4	11.99	1	
14541+5218	A	1625	8.368	117.3	3.37	1	
14543–1810	RST	2930 AB-C	8.447	123.8	6.77	1	
14560+3807	TDS	9348	8.449	80.5	1.50	2	C
14574+8529	BU	353	8.368	100.1	8.29	1	
14585+6515	TDS	9354	8.368	358.2:	1.38:	1	C
14593+6035	MLR	46	8.368	293.2	1.51	2	
15034+3334	HJ	565	8.419	108.4	32.45	4	
15092+3304	HJ	566	8.431	285.1	23.76	6	
15121+1728	HJ	249	8.409	127.3	14.36	1	
15124+3621	HJ	250	8.333	123.3	21.04	1	
15126+1523	STF	1917	8.360	231.9	2.40	1	
15127+1917	STF	1919	8.360	10.1	23.20	1	
15135+5402	MLR	635	8.368	306.1	2.12	1	
15141+1810	COU	65	8.360	151.7	8.19	3	

Table 1—Continued

WDS Desig. α, δ (2000)	Discoverer Designation	Epoch 2000.+	θ ($^{\circ}$)	ρ ($''$)	n	Note
15170+1416	DOO 58 AC	8.409	237.4	35.49	1	
15177–1712	HDS 2150	8.409	193.0	20.84	1	
15185+5159	BEM 18	8.368	15.4	8.60	3	
15205+2206	COU 104	8.409	114.8	5.83	2	
15208–0254	RST 4537	8.409	289.5	1.48	1	
15215+5618	STI 2322	8.458	265.8	14.63	2	C
15218–1822	ARA 237	8.409	114.9	14.08	1	
15250–1837	HJ 1271	8.409	102.1	7.79	1	
15255+6703	STF 3125	8.368	266.5	2.05	1	
15261+2128	STF 1942	8.409	91.4	9.62	1	
15287–1954	HJ 4775	8.409	7.7	11.33	1	
15287+4215	HJ 1274	8.423	310.1	6.95	2	
15292+8027	STF 1972	8.368	79.1	31.32	1	
15301+4618	ROE 2	8.458	82.4	4.55	1	
15304+4542	ROE 48	8.458	219.8	8.68	1	
15306+3504	COU 974	8.423	336.9	1.59	1	
15313–1259	BU 34 CD	8.409	55.3	6.46	1	
15315+2113	BRT 2420	8.409	312.1	11.13	1	
15351–1339	AOT 63	8.409	132.8	27.34	1	
15379+3006	STF 1963	8.344	297.9	5.12	3	
15382+3615	STF 1964 AD	8.333	264.4	14.75	1	
15387–0847	STF 1962	8.409	189.2	11.69	1	
15391–0834	STF 3094	8.409	297.2	2.46	1	
15393–1017	LDS 535	8.409	9.4	13.22	1	
15393–1017	PWS 13 AC	8.409	44.1	36.01	1	
15394+3638	STF 1965	8.344	305.5	6.31	3	
15399–1444	BRT 2740	8.409	335.1	5.32	1	
15399–1946	BU 122	8.409	226.5	1.70	1	
15429+2355	POU 3199	8.486	107.7	14.58	1	
15459+1700	WFC 168	8.360	302.4	7.07	3	
15473–1610	HJ 1278	8.468	129.4	28.91	2	
15492–0314	STF 1974	8.398	159.3	2.35	1	
15532+1931	HJ 2796	8.360	148.0	27.97	1	
15570+1726	HJ 2798	8.360	29.7	7.81	2	
15589–0304	STF 3101	8.398	73.8	2.11	1	
16006–1739	RST 2992	8.486	81.3	2.27	1	
16045+3226	HJ 581	8.344	56.0	21.32	1	
16050+1605	TDS 801	8.360	79.9	1.32	1	C
16054–1948	H 3 7 AC	8.471	19.4	11.92	3	
16120–1928	H 5 6 AC	8.505	336.5	41.03	1	
16120–1928	MTL 2 CD	8.483	54.6	2.27	2	
16152–0046	HJ 1290	8.398	112.1	20.18	1	
16156+0613	TDS 9813	8.448	114.4	1.53	1	C
16189+0144	BAL 1470	8.448	157.6	10.10	1	
16284+3108	STF 2053	8.344	350.9	21.48	1	
16296–1609	J 1591	8.398	1.5	8.45	1	
16308–1308	STF 2050	8.484	218.5	5.71	4	
16339+4717	STF 2068	8.423	251.1	5.04	2	
16355+4741	STF 2072	8.451	178.7	5.01	2	
16387+1613	STF 2073	8.450	74.9	29.80	4	

Table 1—Continued

WDS Desig. α, δ (2000)	Discoverer Designation		Epoch 2000.+	θ ($^{\circ}$)	ρ ($''$)	n	Note
16392+5237	ES	968	8.458	227.2	5.52	2	
16395–1744	HJ	4879	8.398	339.7	19.90	1	
16395–1744	HJ	4879 AC	8.398	258.2	34.88	1	
16412+0331	TDT	32	8.448	155.6	2.00	1	C
16434+1608	HEI	243	8.360	339.5	3.09	1	
16440+4459	KZA	110	8.245	145.9	17.76	1	
16463+2438	AG	351	8.409	303.1	2.91	1	
16516+6133	STI	808	8.458	345.6	5.40	1	105,C
16549+6109	ES	1830	8.316	122.8	4.32	1	88,C
16569+1540	HEI	71 AC	8.360	70.2	31.12	2	
16599–1300	DOO	63	8.409	196.9	6.21	1	
17004–1737	ARA	244	8.639	322.1	7.20	2	
17022–0212	TDT	185	8.505	218.9	1.73	2	C
17079+2301	POU	3257	8.409	334.1	18.25	1	
17080–1802	HO	650	8.628	223.8	7.59	2	
17083–1847	ARA	436	8.639	121.8	15.03	1	
17083–1948	HU	1280 AB-C	8.639	9.2	9.53	2	
17127+2352	POU	3262	8.473	10.9	19.46	3	
17167–1709	STN	34	8.409	289.0	17.16	1	
17183+1912	SLE	13	7.554	311.3	11.31	2	C,4
17183+1912	SLE	13	8.545	310.2	11.29	5	
17184+0451	SCJ	14	8.409	338.4	23.34	1	
17215–1314	WFC	192	8.448	124.5	5.16	1	
17215+5532	ES	2656	8.316	62.9	11.51	1	
17217–1542	FOX	199	8.448	200.2	10.16	3	
17217–1542	FOX	199 AC	8.448	59.2	10.39	1	
17222–1553	FOX	200 AC	8.448	269.4	17.26	1	
17222+3010	ROE	108	8.344	1.1	6.01	1	
17222+3609	ES	2227	8.344	176.5	4.79	2	
17237+3709	STF	2161	8.344	319.8	4.05	1	
17266+3546	STF	2168	8.344	201.2	2.15	3	
17267+1232	HEI	548	8.360	75.1	2.94	1	
17281+4616	STN	35	8.245	183.4	7.56	3	
17294+3245	STF	2174	8.344	330.8	5.42	2	
17300+3035	GRV	957	8.415	29.5	11.54	2	
17302+3222	COU	806	8.344	103.0	5.66	2	
17317+1111	AG	354	8.360	51.6	2.36	1	
17317+3604	ES	2230	8.344	91.8	9.60	2	
17318–1336	HU	178	8.448	354.7	2.29	1	
17357+0409	STF	2187 AB-C	8.459	177.6	3.16	1	
17360–2025	BHA	19	8.448	222.9	6.04	1	
17384–1504	HLD	31	8.448	329.8	1.61	1	
17385–1518	FOX	205	8.448	192.4	14.27	1	
17388–1536	ALD	64	8.448	193.7	1.82	2	
17400+1253	ROE	96	8.360	66.4	7.26	2	
17404+2144	BRT	2436	8.486	187.0	5.57	1	
17414+2111	STF	2195	8.360	285.1	21.73	1	
17420+2127	STF	2197	8.360	356.1	8.03	2	
17424–1924	B	2413	8.448	198.8	11.21	1	
17437+3655	ES	2168	8.344	297.5	6.89	2	

Table 1—Continued

WDS Desig. α, δ (2000)	Discoverer Designation		Epoch 2000.+	θ ($^{\circ}$)	ρ ($''$)	n	Note
17439+1455	J	2115	8.360	222.6	6.53	3	
17446+0235	STF	2202	8.486	93.1	6.73	1	
17457–1832	A	2251	8.639	256.6	2.48	1	
17495+3436	AG	214	8.344	202.6	4.35	2	
17504+2505	HJ	1305	8.483	291.2	23.27	2	
17505+4112	A	698	8.628	255.6	4.14	3	
17506–1550	HJ	2811	8.639	116.5	4.68	1	
17508+3741	STF	2238	8.344	284.1	2.29	1	
17518+2814	STF	2239	8.442	318.7	2.44	1	
17525+3943	COU	1302	8.316	174.4	3.60	1	
17557+4626	BAR	43 AC	8.621	313.7	33.52	3	
17558+3117	SEI	552	8.442	234.6	5.61	3	
17566+5813	ES	20	8.245	212.2	17.19	1	
17574+3540	WAL	86 CD	8.442	214.1	1.90	2	64,C
17587+4231	POP	123	8.245	231.9	3.51	1	
17590–1820	ARA	449	8.639	288.0	14.11	2	
18012–1942	B	2849	8.505	351.0	12.51	2	
18014–1541	FOX	215	8.639	1.9	23.04	3	
18015+2136	STF	2264	8.360	256.9	6.26	2	
18015+4517	STF	2270	8.628	211.2	6.27	3	
18024–1517	FOX	217	8.639	250.7	19.95	2	
18028+7547	STF	2302 AC	8.500	277.9	23.38	4	
18028+7547	STF	2302 BC	8.391	286.8	18.27	4	
18029+4109	ES	1648	8.245	8.9	3.99	1	
18029+5626	STF	2278	8.245	28.4	35.83	1	
18029+5626	STF	2278 BC	8.245	146.0	6.03	1	
18031+4828	STF	2277	8.565	127.6	26.65	1	
18053+3750	ALI	608	8.344	175.3	13.49	2	
18066–1712	HJ	2818	8.639	139.1	17.82	2	
18067+1359	AG	358	8.360	331.5	3.32	1	
18068+2326	COU	417	8.483	90.9	1.45	3	
18077–1913	ARA	729	8.639	342.8	12.99	1	
18078+2606	STF	2280	8.483	3.1	14.21	2	
18084–1856	I	625	8.639	44.1	1.69	1	
18093–1624	BRT	627	8.639	220.5	14.31	2	
18093+4555	WFC	205	8.628	50.5	6.51	3	
18093+5945	STF	2300	8.590	50.8	12.07	3	
18097+5329	BEM	31	8.550	306.0	11.80	2	106
18103+2128	HEI	918 A-BC	8.483	60.9	16.05	1	
18105–1745	J	2197 BC	8.505	83.7	6.32	2	
18109+4242	ROE	5	8.595	114.3	14.96	3	P
18110+3124	ES	345	8.442	14.7	2.73	1	
18111+5330	AG	217	8.565	237.9	14.54	1	
18120+5110	AG	359	8.565	305.7	23.59	1	
18120+5110	AG	359 BC	8.565	106.7	15.02	2	
18125–1847	ARA	460	8.505	85.7	13.97	1	
18128–1618	HJ	2821	8.505	277.8	7.88	1	
18129+2800	ES	472	8.483	11.0	3.52	1	
18133–1817	ARA	462	8.505	343.3	14.82	2	
18135+2142	TDS	909	8.483	21.6	1.61	2	C

Table 1—Continued

WDS Desig. α, δ (2000)	Discoverer Designation	Epoch 2000.+	θ ($^{\circ}$)	ρ ($''$)	n	Note
18140–1931	ARA 737	8.505	103.6	14.15	1	
18148+1327	HJ 1316	8.360	251.1	14.09	1	
18149+1516	ROE 122	8.360	268.8	6.75	2	
18171–1659	HJ 2826	8.505	74.2	26.23	1	93
18181+6051	FOX 81 AB-C	8.565	86.9	35.10	1	
18181+6051	FOX 81 CD	8.565	201.7	15.37	2	
18187–1837	SHJ 264 AB-C	8.486	51.0	5.61	1	
18190+1315	ROE 111	8.360	73.8	3.13	1	
18191+2808	HJ 1318	8.483	139.8	10.14	2	
18192+2525	HLM 11	8.483	165.1	19.85	2	
18200+3611	ALI 376	8.442	240.1	13.68	1	
18211+3150	BRT 260	8.442	231.6	3.89	1	
18230+2742	HJ 1322	8.483	239.1	21.77	2	
18269+4031	ES 1653	8.628	189.8	9.84	1	
18280+2837	COU 638	8.483	138.1	3.22	1	
18283+4930	TDT 896	8.592	152.2	8.92	2	
18300+3710	BU 420 AC	8.442	195.4	20.22	1	
18309+3417	STF 2335	8.442	317.8	12.02	2	
18309+3417	STF 2335 AC	8.442	152.8	25.42	1	
18309+3417	STF 2335 AC	8.628	152.6	25.27	2	
18323+5149	SLE 205	8.592	58.3	11.39	1	
18325+4513	ES 1262	8.592	259.8	1.39	1	
18328+4644	BRT 1918	8.592	190.2	4.16	3	
18334+4823	TDS 928	8.592	316.5	1.90	2	C
18340+5045	ES 786	8.592	322.4	5.83	3	
18344+5240	BEM 34	8.592	27.0	10.44	2	
18346+1801	SLE 206	8.459	225.7	13.35	1	
18361+6405	MLB 214	8.592	123.2	1.93	1	
18372+5122	SLE 227	8.592	227.9	5.94	1	
18379+4014	ES 1655	8.464	26.3	1.84	2	
18384+8107	TDT 969	8.592	32.4:	1.24:	1	C
18393+3517	HJ 1335	8.642	6.7	16.57	2	
18399+3806	HU 1190	8.642	167.3	1.64	1	
18415+4644	BRT 1921	8.464	172.0	6.12	2	
18421+3445	STF 2372	8.642	82.2	24.86	1	
18422+8818	HJ 2971 AC	8.408	64.1	22.23	3	
18436+1207	HJ 1338	8.459	189.1	11.51	2	
18438+2309	POU 3509	8.483	35.9	6.94	2	
18439+2344	POU 3511	8.483	144.1	23.34	1	
18455+0530	STF 2375	8.732	119.4	2.54	1	
18458+5645	MLB 137	8.592	164.9	1.96	2	
18461+3242	SEI 575	8.442	263.0	29.00	1	
18465–0058	STF 2379	8.732	120.8	12.59	2	
18469+5920	STF 2410	8.592	86.8	1.64	2	
18496+0823	HEI 805	8.732	214.3	2.78	1	
18497+6930	MLR 96	8.592	266.9	1.61	2	
18498+3249	H 5 40 CD	8.617	212.2	18.77	3	
18508+1059	STF 2404	8.360	180.9	3.53	1	
18509+2058	COU 317 AC	8.568	181.8	17.21	1	
18516+3739	ES 2025 BD	8.442	10.4	5.52	2	

Table 1—Continued

WDS Desig. α, δ (2000)	Discoverer Designation		Epoch 2000.+	θ ($^{\circ}$)	ρ ($''$)	n	Note
18535+1619	HEI	263	8.568	352.8	6.27	1	
18535+7547	STF	2452	8.314	217.7	5.68	4	
18541+3103	ES	2421	8.442	68.6	7.86	2	
18555+2914	STF	2419	8.568	177.3	3.35	1	
18558+5240	ES	650 AC	8.592	196.4	26.67	2	
18559+3707	ES	2486	8.642	268.1	7.85	2	
18560+3941	ALI	1105	8.642	345.1	12.80	2	
18562+0412	STF	2417	8.732	103.7	22.28	1	
18572+0500	HEI	898	8.568	183.3	2.20	1	C
18584+3554	ES	2031	8.628	38.4	5.32	3	
18598+3246	HLM	13	8.316	30.6	12.80	1	
19002+0237	J	474	8.568	100.8	2.89	1	
19002+5207	ES	651	8.592	137.5	5.05	1	
19016+1631	ROE	124	8.732	234.4	6.05	3	
19019+2718	ES	479	8.483	141.5	8.23	3	
19019+3436	POP	40	8.642	78.8	6.39	2	
19037+3545	STF	2448	8.628	190.9	2.44	1	
19041+2540	BRT	186	8.483	176.0	3.69	1	
19050–0402	SHJ	286	8.732	209.8	39.15	1	
19054+3803	AG	227	8.464	29.5	6.96	3	
19061+3335	TDT	1223	8.642	40.0	2.54	2	C
19063+3158	ES	2367	8.642	141.1	6.86	2	
19063+6632	TDT	1225	8.314	95.1	2.46	2	C
19077+1624	ROE	9	8.732	24.4	14.63	2	
19077+3402	ES	2288	8.642	59.4	4.55	2	
19079+3656	HJ	1369	8.726	153.4	9.73	2	
19083+3608	TDT	1243	8.726	231.3:	2.16:	1	C
19086+3755	STF	2473 CD	8.314	293.5	6.21	1	
19091+3436	STF	2474	8.726	262.5	15.97	2	
19106+3701	A	152	8.628	2.9	2.53	1	
19106+3701	A	152 AC	8.628	167.7	18.73	1	
19107+1428	HJ	1371	8.732	87.5	10.52	2	
19113+3850	HLM	17	8.628	200.1	4.64	3	
19127+4746	HJ	1380	8.628	225.7	5.17	3	
19133+1934	HO	573	8.729	126.7	7.70	2	
19137+1614	BRT	1316	8.732	325.6	4.45	2	
19151+1810	J	1174	8.732	297.6	3.27	1	
19170+2712	ELS	5	8.726	113.2	10.24	2	
19197+4422	STF	2507 BC	8.642	285.2	6.44	1	
19208+3739	ES	2490	8.726	40.3	21.50	2	
19213+5549	STF	2516	8.314	234.2	4.07	2	
19216+4213	HJ	2869	8.464	353.1	6.46	2	
19238+3119	AG	230 A-BC	8.726	69.9	5.48	2	
19238+3942	HJ	2870 BC	8.726	167.9	15.52	2	
19241+3309	ES	80	8.726	188.4	3.89	2	
19247+1136	J	1304	8.732	60.0	2.19	2	
19260+3555	BU	1286 AC	8.642	106.5	6.44	1	
19263+6658	HU	944	8.592	356.2	1.45	2	
19265+1839	BOW	7	8.677	250.6	9.38	1	
19268+2110	STF	2523	8.677	147.8	6.34	1	

Table 1—Continued

WDS Desig. α, δ (2000)	Discoverer Designation	Epoch 2000.+	θ ($^{\circ}$)	ρ ($''$)	n	Note
19269+2112	HLM 23	8.677	44.5	17.32	1	
19270+7322	STF 2550	8.592	251.3	1.88	2	
19282+2013	STF 3132	8.719	39.9	7.85	4	
19282+2013	WAL 113 AC	8.726	326.3	37.15	2	
19282+2013	WAL 113 AD	8.726	307.7	58.05	1	
19289+2439	POU 3851	8.483	205.4	14.09	2	
19292+2053	SLE 948	8.726	20.4	17.09	2	
19293–1742	HJ 5124	8.639	273.9	4.78	1	
19294+2748	OL 217	8.483	253.3	7.38	3	
19296+1800	AG 231	8.726	240.5	4.36	2	
19307+2758	STF A 43	8.713	54.0	34.38	4	
19312+6319	STF 2549 DC	8.592	76.5	28.95	3	
19315–2053	HJ 2875 AC	8.639	332.5	10.31	1	
19332–0403	RST 4631	8.639	198.4	1.54	1	
19333+1209	BRT 1951	8.726	308.7	5.13	2	
19334+4111	COU 2404	8.464	156.1	1.36	1	
19334+4111	COU 2404 AC	8.464	236.9	7.95	3	
19336–1837	HJ 5128 BC	8.639	127.7	4.23	1	
19340–1616	HJ 2880	8.639	149.8	4.07	1	
19342–0648	J 2268	8.639	236.9	5.55	2	
19342+1128	J 1850	8.639	101.5	8.19	2	
19349–1414	J 1676	8.639	8.6	8.68	1	
19360+2924	SLE 647 BC	8.726	76.7	20.08	2	
19367+4759	WFC 223	8.778	53.6	9.87	2	
19368+3538	SEI 649	8.442	251.8	23.78	1	
19373+3555	SEI 650	8.442	152.3	16.33	1	
19373+3555	TOB 158 AC	8.442	323.1	29.41	1	
19374+2249	STF 2551	8.677	41.5	6.82	1	
19379+3223	SEI 651	8.442	258.9	28.92	1	
19381+3511	ALI 4	8.442	233.1	5.68	2	
19403+3831	SEI 658	8.442	137.8	14.22	2	
19403+7045	TDT 1619	8.592	197.6	1.56	1	C
19404+3026	SLE 664	8.726	181.1	7.14	2	
19413+2944	SLE 668	8.732	267.9	10.93	2	
19445+1418	BRT 1953	8.732	194.2	6.31	3	
19487+1149	STF 2583	8.726	106.0	1.40	2	
19516+2009	HU 350	8.464	45.4	3.28	1	
19518+2356	POU 4122	8.464	74.6	6.89	2	
19522+3139	ES 356	8.464	344.3	6.12	3	
19524+2551	STT 388	8.464	135.2	4.91	1	
19524+2551	STT 388 AB-C	8.464	129.2	29.52	1	
19524+2551	STT 388 BC	8.464	128.2	27.32	1	
19528+6411	STF 2604	8.593	182.6	27.76	1	
19546–0814	STF 2594	8.726	170.1	35.66	1	
19561+1151	J 153	8.647	3.0	1.79	1	
19563+1003	J 2188	8.647	144.6	13.13	2	
19564+1751	BRT 2292	8.647	340.7	2.12	1	
19569+0816	HJ 2847	8.647	44.4	14.99	1	
19574+0128	J 1870	8.647	282.6	7.68	1	
19595+1940	J 3039	8.647	186.8	10.05	2	

Table 1—Continued

WDS Desig. α, δ (2000)	Discoverer Designation	Epoch 2000.+	θ ($^{\circ}$)	ρ ($''$)	n	Note
19595+1940	J 3039 BC	8.647	180.2	17.35	1	64,C
19596+1153	SCJ 24	8.711	6.3	38.43	2	
20000+2446	POU 4175	8.647	76.3	13.41	1	
20002+1733	SLE 675	8.647	309.5	7.40	1	
20005+6759	MLB 359 AC	8.593	141.3	35.43	1	97,C
20017-0012	H 1 93	8.677	298.0	1.81	1	
20030+6215	STI 942	8.593	91.9	9.77	2	
20042+1148	STF 2620	8.677	287.2	1.82	1	
20076+1337	AG 399	8.677	254.8	18.00	2	
20099+5856	FOX 248	8.593	170.4	6.86	1	
20099+5856	FOX 248 AC	8.593	346.1	28.36	2	
20119+2351	POU 4262	8.464	5.5	7.61	2	
20120+2350	POU 4263	8.464	293.3	7.78	2	
20127+3213	SEI 1002	8.464	337.1	9.73	2	
20137+2333	POU 4288	8.464	104.7	14.78	1	82
20152-0330	STF 2654	8.727	233.2	14.35	2	
20158-1222	DOO 83	8.726	63.6	11.40	2	
20212+3537	ES 28	8.443	251.2	21.80	1	
20217+3657	SEI 1099	8.443	287.5	6.72	1	
20223+3110	BRT 1954	8.442	277.8	4.82	1	
20224-2014	ARG 38	8.647	293.5	17.67	1	
20224-2014	ARG 38 AC	8.647	225.0	40.28	1	
20239+3238	SEI 1112	8.442	208.3	20.58	1	
20248+3033	ES 363	8.442	277.4	3.12	1	P
20350+3259	HJ 1542	8.541	229.3	16.02	1	
20350+3419	J 791	8.541	178.8	3.30	1	
20350+3419	J 791 AC	8.541	49.5	18.38	1	
20369+3652	SEI 1192	8.541	101.3	31.01	1	
20381+3601	HJ 1553	8.541	192.0	11.56	1	
20404+3758	SEI 1212	8.464	194.4	19.86	2	
20435+1657	STF 2720	8.727	177.9	3.91	2	
20435+3609	ES 2195	8.464	4.1	20.58	2	
20449+3524	SEI 1235	8.541	87.2	34.55	1	67
20478+3057	ES 368	8.541	359.5	3.09	1	
20567-0600	J 2330 AC	8.822	285.5	27.72	1	52
20578-0510	J 1714	8.822	94.3	10.33	1	
20591-0215	BAL 260	8.822	98.9	9.31	1	110
20592+3941	TOB 206 AC	8.778	71.0	38.23	1	
20595-0014	BAL 928	8.822	129.5	13.73	1	
20598+2004	STF 2739	8.732	252.8	3.29	1	
20599+4016	SEI 1363 CR	8.778	37.4	8.68	2	
21001-0541	ROE 114	8.822	306.3	6.47	2	
21005-0548	ROE 148	8.822	87.8	12.87	1	
21011+2345	POU 5097	8.732	279.3	6.64	2	
21023-0941	HJ 929	8.822	0.9	23.76	1	
21023+2554	SLE 511	8.732	10.4	8.67	1	
21044+4057	ROE 44	8.778	43.2	7.07	1	
21047-0429	HJ 5244	8.822	132.2	13.57	1	
21052-1004	AOT 104	8.822	172.8	7.33	1	
21059+1331	SLE 521	8.639	130.4	22.39	2	

Table 1—Continued

WDS Desig. α, δ (2000)	Discoverer Designation	Epoch 2000.+	θ ($^{\circ}$)	ρ ($''$)	n	Note
21066+3436	POP 22	8.546	108.0	6.05	1	
21071+1153	HJ 274	8.639	92.2	25.17	1	
21098–0232	BAL 261	8.639	190.8	8.85	2	92
21099+3100	GRV 431 AC	8.546	15.9	22.79	1	
21099+3100	HJ 1616	8.546	313.1	10.14	1	99,P
21110+0933	STF 2765	8.639	79.4	2.74	1	
21130+2513	POU 5260	8.639	194.3	6.53	2	
21143+0705	HJ 3015	8.639	264.2	16.31	1	
21166+4448	ES 97	8.778	290.2	7.48	2	
21181+2825	HJ 1632	8.639	43.7	8.31	1	
21308+3440	SEI 1522	8.541	179.4	23.97	1	
21322+3341	ES 2383	8.541	43.2	5.43	1	
21326+1351	HEI 286 AC	8.732	280.0	33.65	1	
21348+3204	LSL 1 AD	8.546	133.8	21.68	1	
21353+3020	MLB 718	8.546	308.6	8.19	2	
21358+3104	HJ 940	8.546	328.5	21.30	1	
21377+0637	STF A 56	8.732	347.9	38.98	1	
21390+5729	GUI 36 CD	8.778	324.5	29.94	1	
21423+0715	HU 279	8.732	355.8	2.38	1	
21495+0324	STF 2828 BC	8.732	140.1	3.95	1	
21565+2900	HJ 1706	8.822	262.4	9.86	1	
21571–0439	SCA 109	8.822	314.3	25.27	1	
22042+3507	SEI 1554	8.546	115.9	16.46	1	
22054–0526	HJ 1720	8.822	145.8	12.54	1	
22057+3156	HJ 1722	8.546	51.2	19.03	1	
22143+3745	STF 2882	8.541	148.0	3.42	1	
22165+3759	SEI 1562	8.541	137.1	21.88	1	
22188+2937	KU 135	8.546	345.3	27.21	1	
22224+4152	ES 1590	8.546	171.8	7.71	1	
22272+1509	STF 2905	8.718	284.8	3.26	2	
22282+2332	STF 2910	8.718	332.7	9.32	3	
22284+3533	HJ 1770	8.541	284.8	6.99	1	
22290+3432	HJ 965	8.541	146.9	34.63	1	
22315+1538	HJ 1775	8.718	201.5	12.71	2	
22338+1206	HJ 3121	8.718	31.8	16.99	2	
22343+3558	ROE 80	8.541	206.8	7.72	2	
22357+1426	FAB 18	8.718	164.0	16.73	2	
22359+3938	STF 2922	8.541	185.4	22.20	1	
22387+3718	AG 284	8.541	229.9	26.33	1	
22421+3152	CHE 375	8.547	254.8	20.01	1	
22497+3119	STF 2945	8.541	298.8	4.17	2	
22508+3427	HJ 1817	8.541	239.1	11.14	2	
22519+3002	STF 2949	8.541	182.2	11.38	2	
23075+3250	STF 2978	8.505	145.0	8.40	3	
23174+3813	HDS 3319	8.547	261.9	16.01	1	
23180+4952	ES 925	8.547	64.4	6.52	2	
23228+1843	J 3193	8.822	211.6	7.09	2	
23261–0708	J 1424	8.822	140.1	6.42	2	
23293+2949	ES 400	8.547	211.0	6.15	2	
23301–1717	HJ 3197	8.822	306.7	8.01	1	

Table 1—Continued

WDS Desig. α, δ (2000)	Discoverer Designation	Epoch 2000.+	θ ($^{\circ}$)	ρ ($''$)	n	Note
23309+1845	COU 2712	8.822	41.8	27.79	2	
23527+2920	AG 429	8.547	268.7	6.32	2	
23557+3830	AG 296	8.547	53.9	5.60	3	

C : Confirming Observation

P : Based on proper motion of the primary and the time since the last observation, this pair appears to be physical.

1 : Big change in position since the discovery in Baillaud (1943).

2 : The 2007 measure, being of lower quality and very different from the discovery measure of Aitken (1901), was not included in Mason et al. (2008). With this confirmation the earlier measure is presented as well.

3 : Partial elements in Hopmann (1960b).

4 : The 2007 measure was very different from the discovery measure of Soulie (1983) and was not included in Mason et al. (2008). With this confirmation the earlier measure is presented as well.

N = 54–114 : Number of years since last measure.

Table 2. Measurements of Systems with Orbits or Rectilinear Solutions

WDS Desig. $\alpha\delta$ (2000)	Discoverer Designation	Epoch 2000.+	θ ($^{\circ}$)	ρ ($''$)	n	O–C ($^{\circ}$)	O–C ($''$)	Reference
00032+4508	HJ 1927	8.618	73.2	9.92	1	0.5	–0.12	L
00057+4549	STT 547	8.618	185.1	6.07	3	–0.7	0.12	Popovic & Pavlovic 1996
						–0.3	0.02	Kiyaeva et al. 2001
00159+5233	ES 865	8.634	101.4	3.89	1	0.4	0.06	L
00272+4959	STF 30	8.632	313.1	13.66	4	–0.5	0.02	L
00384+0130	BAL 947	8.975	216.3	18.91	2	–0.3	–0.02	L
00584+5426	HJ 2003	8.634	332.5	16.83	1	0.3	0.02	L
00595+8341	STF 69	8.792	32.2	28.35	2	0.5	–0.15	L
01048–0528	STF 86	8.975	138.3	16.58	2	0.1	0.07	L
01052+4354	A 1810	8.618	182.5	2.96	1	0.5	–0.04	L
01093–0749	HJ 1072	8.975	352.7	36.10	1	–0.5	–0.18	L
01207+4620	STF 112	8.618	336.1	19.18	1	–0.0	0.00	L
01268+4908	ARG 50	8.792	137.3	15.41	2	0.0	0.11	L
01276+6429	STF 121	8.618	268.1	11.98	2	0.0	–0.07	L
01352+8321	STF 118	8.792	93.4	15.26	2	0.2	–0.02	L
01374+5838	STT 33	8.618	77.3	26.60	1	0.2	–0.18	L
01395+3216	SEI 19	8.822	347.2	18.75	1	–0.2	0.05	L
01399+1515	STF 142	8.822	65.2	21.60	1	–0.1	–0.02	L
01488–0125	STF 171	8.822	164.4	34.17	1	–0.0	0.08	L
01510+2107	STF 175	8.822	359.1	27.48	1	0.3	–0.02	L
01515+0457	STF 177	8.822	121.1	30.93	1	0.1	0.24	L
01543–1543	GAL 314	8.823	2.3	35.21	1	–0.0	0.01	L
02354–1247	HJ 2148 AB-C	8.793	344.8	23.57	1	–0.2	–0.43	L
02498–2015	HJ 3533	8.793	267.0	37.69	1	–0.1	–0.19	L
02517+3854	ROE 67	8.675	129.6	26.73	2	–0.2	–0.04	L
03122+3713	STF 360	8.083	125.3	2.80	3	–0.8	–0.01	Mason et al. 2004a
						–0.2	–0.04	L
03187–1834	HJ 3565	8.105	121.8	8.00	6	0.4	0.09	L
03207+4641	BU 1294	8.793	238.9	8.48	2	0.3	–0.01	L
03298+8402	STF 343	8.793	327.3	34.71	1	0.8	–0.17	L
03345+5335	HJ 2192	8.009	238.6	29.98	2	0.0	–0.06	L
03440+3822	STF 434	8.675	82.7	33.32	1	0.1	–0.28	L
03464+7523	STF 418	8.793	64.5	23.88	1	0.2	–0.37	L
04027+5428	AG 307	8.793	328.3	13.24	2	0.2	0.12	L
04085+0827	STF 497	8.077	219.9	11.33	2	0.9	–0.04	L
04367+1930	STF 567	8.077	342.9	2.02	2	1.3	–0.02	Seymour et al. 2002
05247–0742	STF 709	8.129	319.0	12.27	3	–1.4	0.39	L
06212+2108	S 513 BC	8.042	102.3	14.25	2	–2.2	0.41	L
06231–1553	STN 13	8.138	322.0	6.70	1	1.1	–1.58	L
06540+0034	HJ 2352	8.138	26.6	23.57	1	–0.2	–0.03	L
07047+0556	HJ 2360	8.138	150.6	16.34	1	–0.0	–0.13	L
07186+0328	BAL 2265	8.173	89.4	13.83	2	0.0	0.24	L
07492+0605	HJ 61	8.042	166.6	18.37	1	–0.0	0.05	L
07534+2050	HJ 432	8.042	276.7	14.79	2	–0.3	–0.03	L
08047+1204	STF 1179	8.174	201.6	23.35	2	0.1	0.16	L
08095+3213	STF 1187	8.255	23.0	2.97	1	1.6	0.04	Olevic & Jovanovic 2001
08122+1739	STF 1196	8.297	45.5	1.01	2	1.2	–0.02	Mason et al. 2006b
08122+1739	STF 1196 AB-C	8.297	69.7	6.24	2	0.6	0.33	Heintz 1996
10596+2527	AG 342	8.349	112.2	5.19	3	–0.1	–0.09	Kisselev et al. 1997
11128+0453	J 1011	8.288	45.0	4.00	3	0.8	0.02	L

Table 2—Continued

WDS Desig. $\alpha\delta$ (2000)	Discoverer Designation	Epoch 2000.+	θ ($^{\circ}$)	ρ ($''$)	n	O–C ($^{\circ}$)	O–C ($''$)	Reference
11166+4215	HJ 2564	8.368	134.2	32.09	2	0.1	0.15	L
11182+3132	STF 1523	8.362	223.4	1.60	6	0.4	–0.03	Mason et al. 1995
11268+0301	STF 1540	8.351	149.5	28.22	1	2.6	–0.45	Hopmann 1960a
11541+2441	HJ 512 AC	8.349	337.9	23.57	1	–0.2	0.04	L
12023+7222	STF 1588	8.368	35.3	11.78	2	0.1	–0.08	L
12071+6905	STF 1602	8.368	179.5	20.39	1	0.0	–0.10	L
12116+3605	STF 1607	8.349	25.2	26.79	1	0.0	–0.20	L
12151–0715	STF 1619	8.409	266.9	6.86	1	–0.1	–0.09	L
12215+2130	KU 103	8.349	340.6	24.02	1	0.3	–0.08	L
12272+2701	STF 1643	8.401	5.9	2.66	6	0.6	–0.03	Olevic & Cvetkovic 2003
						0.5	–0.04	Mason et al. 2004a
						–0.3	–0.09	L
12274+0723	STF 1644	8.409	239.3	18.77	1	–0.0	–0.09	L
12281+4448	STF 1645	8.368	157.1	9.70	2	–0.1	–0.04	L
12306+0943	STF 1647	8.297	246.8	1.23	2	–2.7	–0.03	Hopmann 1970
12383+0330	BAL 2854	8.409	300.9	16.94	1	–0.5	0.38	L
12383–1131	STF 1664	8.409	223.9	37.53	1	–0.1	–0.22	L
12417–0127	STF 1670	8.288	37.8	0.96	1	0.0	–0.04	Scardia et al. 2007
12454+1422	STF 1678	8.349	170.9	36.82	1	–0.2	–0.19	L
12479+3208	SEI 533	8.349	267.5	22.62	1	0.1	0.37	L
12525+0712	HJ 2621 BC	8.409	187.0	26.35	1	0.2	0.03	L
13005–0604	HJ 1224	8.409	284.1	16.31	1	–0.2	0.18	L
13062+4055	HJ 2639 BC	8.368	102.2	23.58	1	0.4	0.77	L
13064+7618	HJ 2644	8.368	250.9	36.55	1	0.1	0.05	L
13120+3205	STT 261	8.349	338.6	2.53	1	–0.5	–0.06	L
13227+3556	HJ 530	8.422	46.9	38.96	3	–0.9	–0.11	L
13235+2914	HO 260	8.411	85.1	1.50	1	1.1	–0.10	Mason et al. 2004a
13282+0928	STF 1746	8.349	246.9	23.38	2	0.4	0.28	L
13328+1649	VYS 6	8.349	51.2	2.87	1	2.0	–0.01	Heintz 1990
13343–0019	STF 1757	8.422	132.3	1.79	2	–0.4	–0.08	Heintz 1988
13349+3314	HJ 2662	8.412	280.5	23.00	2	0.0	0.06	L
13394+3536	AG 191	8.412	299.9	9.87	3	–0.8	–0.27	L
13450–1955	HJ 2674	8.447	17.3	17.91	1	0.0	0.07	L
13491+2659	STF 1785	8.349	179.2	3.13	1	–0.6	–0.01	Heintz 1988
13532+0514	HJ 2690	8.435	101.7	26.20	2	0.1	0.15	L
13540+3209	KU 47	8.412	149.2	21.52	2	0.0	0.04	L
13550–0804	STF 1788	8.423	97.7	3.38	2	–1.4	–0.17	Hopmann 1970
14024+4620	SWI 1	8.332	24.2	3.75	1	–0.8	0.11	Seymour et al. 2002
14065+7058	HJ 2703	8.368	343.1	12.20	2	0.4	–0.06	L
14088+7715	HJ 2706	8.368	83.0	13.29	2	0.4	0.23	L
14165+0145	H N 1 AC	8.486	143.7	30.77	2	–0.5	0.46	L
14195–1343	BU 116	8.398	274.6	3.96	1	–0.1	0.09	L
14203+4830	STF 1834	8.368	102.9	1.54	1	–0.2	0.00	Seymour & Mason 2000
14218+0355	BAL 2861	8.398	316.9	8.40	1	0.4	–0.03	L
14287–1012	STF 1847	8.398	270.0	36.64	1	–0.0	0.06	L
14463+0939	STF 1879	8.398	83.9	1.67	1	–0.5	–0.04	Mason et al. 1999
14485–1720	BU 346	8.398	276.5	2.54	1	1.1	–0.14	L
14497+4843	STF 1890	8.368	45.8	2.63	1	–0.1	–0.01	L
14524–2023	HJ 2749	8.478	321.4	31.70	2	–0.1	0.34	L
14557+4116	HJ 1260	8.368	174.8	19.95	1	–0.6	0.12	L

Table 2—Continued

WDS Desig. $\alpha\delta$ (2000)	Discoverer Designation	Epoch 2000.+	θ ($^{\circ}$)	ρ ($''$)	n	O–C ($^{\circ}$)	O–C ($''$)	Reference
14563+2928	STF 1893	8.419	209.6	22.11	3	−0.1	−0.16	L
14595+5510	STI 2317	8.368	123.5	33.11	1	−0.1	−0.02	L
15010+3123	STF 1901	8.465	185.2	19.39	4	0.1	0.26	L
15041+2923	HJ 2761	8.409	168.4	37.16	1	0.2	0.04	L
15174+4348	STF 1934	8.423	13.3	9.53	2	−0.2	−0.08	L
15183+2650	STF 1932	8.409	262.6	1.56	1	−0.3	−0.07	Heintz 1965
15227−0132	STF 3093	8.409	154.3	22.73	1	−0.1	−0.05	L
15245+3723	STF 1938 Ba,Bb	8.344	6.1	2.22	2	0.3	−0.03	Söderhjelm 1999
15346+4331	STF 1961	8.423	20.4	28.10	2	−0.4	−0.13	L
15348+1032	STF 1954	8.360	173.4	4.05	2	0.5	0.06	Mason et al. 2004a
15382+3615	STF 1964 CD	8.344	19.7	1.51	1	0.6	−0.02	Drummond et al. 1995
15499+2547	HLM 6	8.398	179.5	24.00	1	1.1	0.34	L
15550+2953	HJ 2797	8.344	77.0	34.78	2	0.1	0.46	L
15590+0034	HJ 1283	8.447	124.2	22.65	2	0.0	0.08	L
15598+1723	STF 1993	8.360	42.2	20.64	1	−0.3	−0.13	L
16060+1319	STF 2007	8.360	321.9	38.05	1	−0.2	−0.09	L
16081+1703	STF 2010	8.360	12.8	26.96	1	−0.4	−0.27	L
16121+1433	STF 2017	8.360	257.2	29.35	1	−0.0	−0.09	L
16133+1332	STF 2021	8.360	355.7	4.02	2	0.3	−0.06	Hopmann 1964
16147+3352	STF 2032	8.344	237.2	7.05	2	0.0	−0.04	Raghavan et al. 2009
16160+0721	STF 2026	8.398	17.6	3.40	1	−0.7	0.00	Heintz 1963
16271+4255	BU 815	8.316	326.4	24.22	2	−1.2	0.21	L
16289+1825	STF 2052	8.360	120.2	2.08	1	−0.9	−0.09	Söderhjelm 1999
16309+0159	STF 2055	8.423	35.7	1.38	2	−0.1	−0.07	Heintz & Strom 1993
16365+4856	HLM 7	8.458	8.0	25.41	1	−0.1	−0.03	L
16449+0957	STF 2090 CD	8.360	38.2	21.88	1	−0.2	−0.01	L
16489+1949	BRT 2425	8.360	317.2	4.28	2	−1.4	−0.04	L
16490−1936	HJ 4888	8.447	224.2	13.02	1	−0.4	−0.02	L
16566+5127	ES 2654	8.595	282.2	38.07	1	−0.0	0.07	L
17010+6807	MLR 199	8.458	75.1	19.67	1	0.0	0.30	L
17048+2805	STF 2120	8.409	231.2	23.45	1	0.1	0.01	L
17053+5428	STF 2130	8.458	9.9	2.23	1	2.1	−0.11	Heintz 1981
17082+0143	AG 208	8.409	296.6	12.36	1	0.3	−0.28	L
17121+2114	STF 2135	8.486	193.0	8.48	2	0.2	−0.09	L
17153−2636	SHJ 243	8.314	143.1	4.92	3	−0.2	−0.02	Irwin et al. 1996
17166+2635	STF 2145 AB-C	8.409	184.2	18.41	1	0.5	−0.04	L
17166+0325	STF 2141	8.489	122.7	39.36	3	−0.0	−0.12	L
17200+0446	BAL 2888	8.448	106.8	15.48	1	−0.1	−0.05	L
17226+0410	BAL 2891	8.448	20.1	22.67	1	0.0	0.50	L
17262+2927	STF 2165	8.486	61.2	10.18	2	0.0	0.07	L
17278+3607	AG 209	8.344	186.6	33.55	1	−0.0	−0.03	L
17386+5546	STF 2199	8.595	56.3	2.01	2	1.8	0.09	Popovic & Pavlovic 1995
17419+7209	STF 2241	8.585	15.7	29.90	3	−0.3	−0.37	Romanenko 1994
						0.3	0.14	Romanenko 1994
17457+3452	AG 213	8.442	175.7	22.24	1	0.1	−0.05	L
17483+4506	SMA 79	8.595	90.1	15.45	2	−0.2	0.02	L
17528+6700	BRD 3	8.565	324.5	20.34	2	−0.2	0.28	L
17528+6700	BRD 3 AC	8.565	317.3	9.81	2	−0.1	0.18	L
18002+8000	STF 2308	8.565	231.5	18.59	1	−0.2	−0.23	L
18029+5626	STF 2278 AC	8.245	37.6	33.46	1	0.1	−0.24	L

Table 2—Continued

WDS Desig. $\alpha\delta$ (2000)	Discoverer Designation	Epoch 2000.+	θ ($^{\circ}$)	ρ ($''$)	n	O–C ($^{\circ}$)	O–C ($''$)	Reference
18031–0811	STF 2262	8.486	285.1	1.56	1	0.9	–0.08	Söderhjelm 1999
18032+2522	STF 2268 AC	8.483	202.4	23.94	1	–0.5	–0.06	L
18055+0230	STF 2272	8.486	133.3	5.45	2	0.1	–0.01	Eggenberger et al. 2008
18093+5945	STF 2300 AD	8.593	89.7	25.09	2	0.2	0.62	L
18102+3402	STF 2291	8.442	339.4	29.74	1	–0.1	0.09	L
18111+3258	ES 185	8.442	283.5	11.87	2	–0.5	–0.05	L
18259+6255	STF 2334	8.592	201.8	16.77	2	–0.5	–0.03	L
18332+4010	STT 356	8.610	302.0	29.27	4	–0.4	0.40	L
18355+2104	STF 2345	8.483	223.9	11.89	2	0.1	–0.03	L
18428+5938	STF 2398	8.314	176.6	12.10	3	–0.0	0.18	Heintz 1987
18435+2743	STF 2374	8.628	39.1	13.56	2	0.2	–0.08	L
18443+3940	STF 2382	8.553	348.4	2.27	2	0.6	–0.13	Mason et al. 2004b
						0.6	–0.08	Novakovic & Todorovic 2006
18443+3940	STF 2383 CD	8.500	79.7	2.30	2	1.0	–0.06	Docobo & Costa 1984
18447+4550	HJ 1346 AC	8.464	216.2	27.77	1	–0.1	–0.09	L
18516+3739	ES 2025	8.442	350.9	24.66	2	–0.1	0.16	L
18518+3410	GYL 10	8.442	243.4	24.14	1	0.1	0.24	L
18521+5120	STF 2416	8.314	157.6	20.37	1	–0.1	0.53	L
18560+3347	STF 2421	8.619	57.5	24.28	3	–0.2	–0.28	L
18577+0942	HJ 5505	8.568	124.6	14.70	1	1.3	0.20	L
18582+3216	GYL 12	8.642	146.2	20.18	2	–0.6	0.02	L
19011+3210	GYL 13	8.628	304.7	35.10	1	–0.1	0.06	L
19022+0845	STF 2436	8.568	314.4	30.19	1	–0.2	–0.09	L
19027–0043	STF 2434 A-BC	8.568	90.7	26.87	1	–0.3	–0.19	L
19037+1658	STF 2442	8.732	209.4	10.65	2	–0.2	–0.04	L
19051+4008	STF 2453	8.314	87.0	13.59	1	1.0	0.23	L
19058+3831	STF 2456	8.464	341.5	17.89	1	–1.1	0.14	L
19059+3502	HZG 13	8.628	134.8	26.63	1	–0.4	0.08	L
19086+3755	STF 2472	8.314	339.1	22.37	1	0.0	0.16	L
19121+4951	STF 2486	8.628	205.4	7.28	3	0.2	–0.08	Hale 1994
19168+6742	STF 2514	8.592	350.4	22.44	2	–0.2	–0.10	L
19174+6310	ES 2677	8.592	89.7	14.00	2	1.3	–0.14	L
19217+0912	AG 229	8.732	161.8	32.96	1	–0.2	–0.01	L
19249+2126	WSI 22	8.360	270.9	14.84	1	–0.2	0.08	L
19251+3511	HJ 1394	8.726	28.7	17.88	2	0.1	0.48	L
19260+3555	BU 1286	8.642	45.8	21.68	2	0.1	0.07	L
19266+2719	STF 2525	8.483	290.1	2.06	2	0.0	–0.04	Heintz 1984b
19266+2530	STF 2524	8.483	83.2	5.38	3	–0.4	–0.09	L
19293+3437	SEI 608	8.642	225.1	12.23	2	0.0	0.06	L
19312+6319	STF 2549 AC	8.592	284.3	27.85	3	0.0	–0.09	L
19312+6319	STF 2549 AD	8.592	270.3	55.99	1	–0.0	0.69	L
19360+2924	SLE 647	8.726	38.0	22.08	2	–0.7	0.36	L
19362+3157	SEI 645	8.442	27.8	18.83	2	0.7	–0.42	L
19370+6350	STF 2564	8.593	147.6	9.17	3	–0.8	–0.03	L
19383+2542	ES 492	8.726	212.3	4.95	2	–1.6	0.11	L
19464+3344	STF 2576 FG	8.642	159.9	2.89	2	0.0	0.00	Söderhjelm 1999
19478+5154	AG 239	8.464	239.0	15.90	1	0.3	–0.00	L
19524+2551	STT 388 AC	8.464	129.4	31.80	1	–0.1	0.12	L
19574+6124	HJ 2922	8.593	347.1	11.23	2	0.7	0.22	L
20014+1045	STF 2613	8.677	354.5	3.65	1	2.6	–0.52	Hopmann 1973

Table 2—Continued

WDS Desig. $\alpha\delta$ (2000)	Discoverer Designation	Epoch 2000.+	θ ($^{\circ}$)	ρ ($''$)	n	O–C ($^{\circ}$)	O–C ($''$)	Reference
20068+0157	A 2278 AC	8.677	356.4	23.07	1	0.2	0.05	L
20123+3205	STF 2649	8.464	150.8	21.29	1	–0.1	–0.13	L
20144–0603	STF 2646	8.726	39.5	18.27	2	0.2	–0.17	L
20199+1733	HJ 2950	8.647	282.8	14.52	1	0.0	0.05	L
20224–2014	ARG 38 BC	8.647	199.1	37.61	1	–0.3	0.06	L
20241+2823	AG 404	8.442	247.3	34.19	1	–0.1	–0.01	L
20252+2352	POU 4480	8.647	34.9	27.77	1	–0.2	0.51	L
20431+3645	SEI 1227	8.464	166.5	15.27	1	–0.4	0.15	L
20462+1554	STF 2725	8.677	11.0	18.72	1	–0.3	–0.04	Hopmann 1973
20467+1607	STF 2727	8.677	265.6	9.07	1	0.2	–0.03	Hale 1994
20493+3314	ES 31	8.541	237.9	13.67	2	–0.4	0.03	L
20541+1306	STF 2734	8.677	225.1	24.00	1	–0.0	0.01	L
20565–0134	HJ 927	8.677	346.5	37.37	1	–0.2	–0.07	L
20582+0356	BAR 13 AC	8.677	249.3	21.45	1	–0.3	0.31	L
21009+4730	BU 1290	8.778	33.0	8.68	2	0.5	–0.19	L
21062+1311	STF 2754	8.639	297.5	30.15	1	–0.6	0.18	L
21065+3227	STF 2759	8.546	332.9	18.98	1	–0.8	0.15	L
21066+3436	POP 22 AC	8.546	15.9	30.45	1	–0.1	0.44	L
21068+3408	STF 2760	8.546	31.9	4.42	2	–1.0	0.05	L
21070+4125	BU 988 AC	8.443	8.6	9.37	2	1.2	0.05	L
21089+4815	ARG 42	8.778	60.1	21.16	1	0.2	0.01	L
21093+0048	BAL 1225	8.639	215.0	18.43	1	0.2	0.04	L
21098–1834	HJ 3010	8.639	301.7	33.22	1	–0.3	–0.12	L
21124–1500	H 1 47	8.639	309.1	4.11	1	–22.8	0.97	Hopmann 1974
						–0.2	–0.02	L
21144+2905	STF 2779	8.639	165.4	15.28	1	–0.1	0.02	L
21174+3203	HJ 931	8.639	357.2	10.03	2	–0.4	–0.04	L
21289+1105	STF 2799	8.464	261.6	1.73	2	2.3	–0.01	Popovic 1987
21328+5839	HJ 1659	8.778	287.9	7.68	3	–0.0	–0.04	L
21330+2043	STF 2804	8.732	356.8	3.25	1	–0.1	–0.07	L
21357+5133	HJ 3042	8.778	51.9	19.43	1	–0.3	0.02	L
21419+0708	HJ 3050	8.732	37.7	21.02	2	0.4	–0.04	L
21495+0324	STF 2828	8.732	140.7	33.15	1	0.4	–0.05	L
21495+0324	STF 2828 AC	8.732	133.9	32.59	1	–0.7	–0.06	L
21582+8252	STF 2873	8.778	66.7	13.69	2	0.3	–0.05	Grosheva 2006
						0.4	–0.05	Grosheva 2006
22007–0448	SCA 113	8.822	279.0	16.36	1	0.4	0.19	L
22014+3243	HJ 951	8.546	60.6	12.69	2	–0.1	–0.01	L
22033+6051	STF 2860	8.778	257.0	12.79	2	0.2	–0.04	L
22038+6438	STF 2863	8.778	274.6	8.18	2	0.5	–0.15	Zeller 1965
22044+7013	STF 2865	8.778	198.9	28.92	1	–0.0	–0.13	L
22057+2954	HJ 1721	8.546	265.1	12.54	2	–0.4	0.11	L
22166+0147	HJ 3102	8.648	179.1	14.65	1	–0.1	–0.01	L
22226+3328	ES 390	8.541	267.3	8.77	2	–0.3	–0.02	L
22288–0001	STF 2909	8.709	170.0	2.02	4	–3.1	–0.09	Scardia et al. 2009
22326+0725	STF 2915	8.718	126.3	14.94	2	–0.0	0.03	L
22331+2111	STF 2919	8.718	251.7	21.52	2	–0.1	0.06	L
22357+1719	HJ 967	8.718	15.9	19.94	2	0.3	0.02	L
22396–1237	STF 2928	8.601	282.4	3.03	2	–1.4	–0.22	L
22415+3003	STF 2932	8.541	282.2	21.94	1	–0.1	0.01	L

Table 2—Continued

WDS Desig. $\alpha\delta$ (2000)	Discoverer Designation	Epoch 2000.+	θ ($^{\circ}$)	ρ ($''$)	n	O–C ($^{\circ}$)	O–C ($''$)	Reference
22478–0414	STF 2944	8.601	299.6	1.87	1	0.4	–0.06	Zirm 2007
23067+3302	STF 2975	8.541	314.9	36.66	1	–0.3	0.03	L
23133+2205	STF 2990	8.505	56.5	2.47	2	0.7	–0.03	L
23212+3526	STF 3006	8.505	151.9	7.17	3	–0.3	–0.05	L
23224–1259	HJ 310	8.822	338.4	10.15	1	0.4	–0.29	L
23238–0828	STF 3008	8.822	149.9	6.43	2	–0.0	–0.02	L
23257–1655	HJ 3192	8.822	117.6	33.52	1	0.0	0.63	L
23263–1138	HJ 3193	8.822	222.7	40.56	1	–0.1	0.59	L
23413+4954	ES 2732	8.618	249.7	10.65	2	0.3	0.00	L
23514+0225	HJ 3220	8.822	11.0	37.03	1	–0.2	0.70	L
23564–0930	STF 3046	8.822	267.6	3.68	1	0.1	–0.26	L

Table 3. Double Stars Not Found

Coordinate α, δ (2000)	Discoverer Designation	Most Recent Date	Published Position Angle (θ)	Observed Separation (ρ)	Published Primary	Magnitude Secondary
15086+1103	HJ 247	1820	50	15.0	10.0	11.0
15399+0227	SLE 926	1910	48	15.6	11.6	12.6
17053+1947	SLE 6	1982	138	20.3	9.5	11.0
17128+2433	POU 3264	1892	299	15.8	11.6	11.9
17184+0445	SLE 18	1982	333	17.7	11.0	11.5
17219–1846	SLE 14	1982	290	16.9	10.0	10.2
18444+2015	ALD 4	1916	339	3.9	10.9	11.0
18553+1217	HEI 564	1987	233	2.8	10.0	10.2
19258+4556	HJ 1400	1909	181	5.8	10.4	11.1
20419+3143	SEI 1221	1896	254	2.0	10.9	11.1
21098+3143	ES 2440	1930	202	5.0	10.9	11.9
22246+2337	POU 5698	1891	90	11.6	10.8	11.1